

MONTHLY WEATHER REVIEW,

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(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to October 14th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 143 Signal Service stations and 15 Canadian stations, as telegraphed to this office; 165 monthly journals and 160 monthly means from the former, and 15 monthly means from the latter; reports from 23 Sunset stations; 204 monthly registers from Voluntary Observers; 41 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of, Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

The general distribution of the atmospheric pressure, as reduced to sea-level, for the month of September, 1880, over the United States and Canada is shown by isobaric lines on chart No. II. At a few out-lying stations the means are given in figures indicating English inches. The regions of highest pressures, as usual, include the South Atlantic States and the North Pacific Coast region. The regions of lowest pressures are the valleys of the Red River of the North and of California.

Departures from Normal Values for September.—The barometric means for September, 1880, when compared with the average for past years, show but slight and unimportant departures. The New England coast reports slight deficiencies, amounting at Boston and Portland to 0.05 inch. In the Northwest, St. Vincent—where the pressure was 0.11 below—is the only station reporting any great departure from the normal. In the South Atlantic States, the following excesses are reported: Savannah and Jacksonville, 0.05, and Augusta, 0.07 above the normal.

Barometric Ranges.—The local barometric ranges, reduced to sea-level, have been quite irregular but not excessive. The ranges along the Gulf coast have been from 0.20 at Key West to 0.47 at Mobile and New Orleans. In the Atlantic States, the range steadily increased northward from 0.41 at Jacksonville to central New England, where the following ranges occurred: Boston, 0.84; Springfield, 0.86; and Albany, 0.87. In the Upper Lake region the ranges were from 0.65 at Detroit to 0.86 at Marquette. In the Northwest the ranges were decidedly irregular, being 0.78 at Bismarck, 0.88 at Breckenridge and 0.94 (the largest in the country) at St. Vincent. On the Pacific coast, the following ranges were reported: 0.24 at San Diego, 0.29 at San Francisco, and 0.55 at Portland.

Areas of High Barometer.—During September, 1880, six areas of high pressure prevailed. No. I was a storm of marked severity in the Lake region, where, during its prevalence, a number of disasters to shipping occurred. No. II is particularly noticeable as having originated on the Pacific coast, and as having moved eastward across the Rocky Mountains. The only extensive and damaging frosts occurred in connection with area No. VI during September 30th and October 1st.

No. I.—During the 5th and 6th the barometer rose rapidly in the Northwest, and on the morning of the 7th was 0.45 above the normal at Fort Garry. Moving slowly eastward the highest pressure was 0.42 above the normal at Duluth on the morning of the 8th. During the 8th and 9th the area remained central over the Lake region. From the afternoon of the 7th till the afternoon of the 8th brisk to high northerly winds, heavy sea and rough weather prevailed on the Lower Lakes. Maximum wind velocities ranging from 28 to 40 miles were reported from various stations. On Lake Erie the Schooner *Jane Bell* was totally wrecked and two lives lost; Revenue Cutter *Perry* and a number of other vessels were driven ashore. At Sandusky boats were unable to leave on the 7th and 8th. During the 10th the area moved southeastward to the South Carolina coast, where it slowly dissipated during the 11th and 12th. At midnight of the 7th Cautionary Signals were ordered at Erie and at all stations on Lake Ontario. These signals were lowered at midnight of the 8th, not having been justified. During the passage of this area light frosts occurred generally in Iowa, Wisconsin, in the northern half of Indiana, Ohio and Illinois, and at elevated stations in New England. In connection therewith, the minimum temperatures of the month were reported from the greater part of the Western Gulf States.

No. II.—During the 10th the pressure rapidly increased in Washington Territory; Olympia barometer 0.37 above the normal. The afternoon of the 11th the highest pressure was at Umatilla—0.41 above the normal—and at Ft. Keogh on the afternoon of the 12th, 0.46 above the normal. Moving southeastward it was central the morning of the 13th, with decreasing pressure, in the Lower Missouri valley. By the morning of the 14th the central area had moved into the Lake region, where it slowly dissipated during the day. On the afternoon of the 12th Cautionary Off-shore Signals were ordered for Indianola. They were lowered at midnight of the 13th having been justified as to direction, but not as to velocity.

No. III.—During the 17th the pressure rose steadily in the North Pacific Coast region. On the afternoon of the 18th the highest pressure was at Olympia, 0.27 above the normal. On the following day the area had dissipated or moved eastward into the Plateau Districts.

No. IV.—During the 19th the pressure rose in Montana at midnight; Ft. Keogh barometer 0.31 above the normal. On the morning of the 21st the barometric ridge of high pressure covered the Missouri, the Upper Mississippi and a portion of the Ohio valley. Highest pressures, 0.21 at Cairo and 0.27 at Ft. Buford. During the day the area moved eastward into the Lake region where it remained stationary with nearly unchanged pressure until the morning of the 23rd. Moving thence eastward the central pressure on the 24th was in New England; Albany barometer 0.32 above the normal. During the day it slowly dissipated. During the passage of this area frost was general in the Lake region, the interior of New England and the Middle Atlantic States. In connection therewith the minimum temperatures for the month occurred in New England.

No. V.—During the 23rd and 24th the pressure rose steadily in the North Pacific Coast region; Olympia barometer at midnight of the latter date 0.35 above the normal. The advent of this area was marked by light rains in Oregon and Washington Territory. During the 25th the area moved into the Plateau districts, where it gradually dissipated.

No. VI.—On the 28th the barometer rose in the Upper Missouri valley; Fort Buford barometer at midnight 0.31 above the normal. Moving southeastward on the afternoon of the 29th the ridge of highest pressure extended from Texas northward to the Red River of the North valley. On the morning of the 30th the area covered the Lower Mississippi valley. At midnight the area of highest pressure was over the Middle Atlantic States; Baltimore and Cape Henry barometers 0.25 above the normal. The passage of this area was marked by the minimum temperatures for the month for the entire country east of the Mississippi river, excepting New England and North Carolina.

Areas of Low Pressure.—Thirteen such areas pertaining to the month of September, 1880, are described, and the course of eleven centres are shown on Chart No. I. The tracks of areas VI and VII could not be indicated with sufficient accuracy and are omitted. Only one area No. IX, originating over the Pacific ocean, crossed the Rocky Mountains. Area No. III was a storm of unusual severity, particularly along the New England the Virginia and North Carolina coasts. Areas No. VIII and XII were severe storms which passed through the Lake region.

No. I.—was a continuation of the Florida cyclone described in the August REVIEW. Central in Mississippi the morning of the 1st it moved northward with increasing pressure and was in Illinois the morning of the 2nd, thence, by a northeastward track, passed down the valley of the St. Lawrence during the 3rd and 4th. No signals were displayed during the passage of this area. The only cases of brisk winds reported were: SE. 32 at Delaware Breakwater, and S. 25 at Cleveland.

No. II.—The pressure decreased steadily in the South Atlantic States from the morning of the 6th until the afternoon of the 7th, at which time Charleston and Smithville barometers stood at 0.25 below the normal. At this time the area was probably central off the coast of South Carolina. By the morning of the 8th the area was probably central off Cape Hatteras. At that time brisk to high northeasterly winds prevailed from Sandy Hook southward to Cape Hatteras, at which latter place the barometer stood at 0.35 below the normal. From Cape Hatteras this storm probably moved northeastward during the 8th and 9th, being at midnight of the latter date to the eastward of Nova Scotia.

On the afternoon of the 7th Cautionary Signals were ordered from Cape Lookout northward to Cape Henry, and at midnight were displayed along the New Jersey coast. These signals—fully justified—were continued in connection with advancing low area No. III. At midnight of the 8th a NE. wind of 30 miles maximum velocity, was reported from Eastport.

No. III.—This area probably developed in the Gulf of Mexico where, during the afternoon of the 7th, the pressure slowly decreased, while thunderstorms, with heavy rain-falls, occurred till the morning of the 8th, at which time the barometer at Pensacola stood at 29.84. The area moved north-eastward, and at midnight was central off the South Carolina coast: Charleston barometer 0.24 below the normal. In the afternoon of that date a southwest wind of 30 miles prevailed at Cedar Keys. On the morning of the 9th the storm was central, with great violence, on the North Carolina coast, from which section an east wind of 50 miles at Cape Henry and south 44 miles at Cape Lookout were reported. Moving northeastward off the coast, the storm was central the afternoon of the 10th east of Cape Cod, and on the afternoon of the 11th to the eastward of Cape Breton Island. This storm was one of unusual severity, especially at Cape Henry where considerable damage was done, and along the New England coast where numerous small wrecks and disasters were reported. As far as known no lives were lost. Cautionary Signals from Cape Lookout northward to New York, displayed for low area No. II, were continued for this area, and on the afternoon of the 9th were displayed for all New England stations, except at Eastport and Portland, where they were ordered at midnight. These signals were somewhat late for the New England coast. On the afternoon of the 9th signals at Kittyhawk, Cape Lookout and Cape Hatteras were lowered, while those to the northward were displayed until the evening of the 10th, as Cautionary on the New England coast, and as Cautionary Off-shore on the New Jersey coast. Maximum velocities were reported as follows: Portland, N. 28 miles; Eastport, NE. 30; Sandy Hook, NE. 38; Atlantic City, NE. 40; Thatchers Island and Kittyhawk, NE. 44; Wood's Holl, NW. 44; Cape Lookout, S. 44; Delaware Breakwater, NE. 46; East Shoreham, NE. 48; Cape Hatteras, SW. 48; and Cape Henry, NE. 50.

No. IV.—During the 8th the pressure gradually fell in the Northwest; lowest pressure the morning of the 9th, 0.21 below the normal at Bismarck. The pressure continued to fall slowly until midnight of the 10th, when Bismarck barometer stood at 0.37 below the normal. This storm, passing to the northward of the Lake region, passed down the valley of the St. Lawrence during the 13th. On the morning of the 11th, Cautionary Signals were ordered for Lake Michigan and during the 12th for Lake Huron and the western part of Lake Erie. These signals were lowered the morning of the 13th, having been justified, except at Alpena: maximum velocities, Cleveland, W. 25; Grand Haven, W. 28; Milwaukee, SW. 28; Escanaba, S. 29.

No. V.—This area was developed between high area No. II and low area No. IV. On the morning of the 13th a sharp barometric fall was reported from Mississippi northeastward to the Gulf of St. Lawrence. This sharp fall continued in the Middle Atlantic States where the area was central on that afternoon; Washington and Philadelphia barometers 0.22 below the normal. Moving northeastward the area remained nearly stationary off the Massachusetts coast till the morning of the 15th, at which time the lowest pressure was reported from Boston, 0.40 below the normal. Central off the coast of Maine at midnight of the 15th it passed northward over New Brunswick to the Gulf of St. Lawrence. On the afternoon of the 13th, Cautionary Signals were ordered from Atlantic City southward to Chincoteague, and at midnight from Kittyhawk to Cape Lookout. These signals were lowered during the evening and night of the 24th, except at Delaware Breakwater and Cape May, where they were continued until the afternoon of the 15th. The following maximum velocities were reported: Cape Hatteras, NE. 26 miles; Delaware Breakwater, NW. 40; Kittyhawk, N. 44. A maximum velocity of NW. 36 miles also prevailed at Cape Henry. On the New England coast Cautionary Signals were ordered late at midnight of the 14th from Wood's Holl to Eastport. These were lowered at midnight of the 15th, except at Eastport, which remained displayed till the following morning. The following maximum velocities were reported: Wood's Holl, SW. 26 miles; Portland, NE. 27; Eastport, NE. 43.

No. VI.—This area, developing in Saskatchewan during the 13th, moved eastward too far north of the United States to permit its course to be accurately charted. Lowest pressure was reported from Bismarck the morning of the 14th, 0.43 below the normal. Its centre on the afternoon of the 15th was considerably to the northward of Lake Superior. On the morning of the 14th Cautionary Signals were ordered for Milwaukee and in the afternoon for Grand Haven and Escanaba; the latter somewhat late. They were lowered on the afternoon of the 15th, having been justified only at Escanaba, S. 27 miles.

No. VII.—This area developed in Manitoba during the 15th. Its course was apparently eastward and on the 16th was central considerably to the northward of Lake Superior. No signals were displayed and no cases of high wind were noted in connection therewith.

No. VIII.—This area apparently developed in Saskatchewan during the 16th. Moving south-eastward, it was central in Dakota at midnight; Bismarck barometer 0.35 below the normal. On the morning of the 17th a barometric trough extended southwestward from Lake Superior to south-eastern Dakota. On that afternoon the trough had prolonged itself and reached from northern

Michigan to Kansas. At midnight the area had divided into two parts. The eastern portion moved northeastward into Canada, while the western part continued with decreasing pressure nearly stationary in the Lower Missouri valley until the morning of the 18th, when Omaha barometer was 0.41 below the normal. Moving thence in a nearly northeasterly course it was central the morning of the 19th in Minnesota. By the morning of the 20th had passed into Manitoba. Its subsequent course was too far northward of our stations to permit of accurate charting, but apparently it reached Ontario in an easterly course by the morning of the 21st, and during that day moved down the Gulf of St. Lawrence. During the night of the 18th and 19th, brisk winds were reported from scattering stations in the Upper Lake region; the highest being 32 miles at Milwaukee. On the afternoon of the 20th, brisk or high winds were reported from every station in the Upper Lake region; maximum velocities ranging from SE. 22 at Chicago to SW. 44 at Milwaukee. Cautionary Signals were ordered on the afternoon of the 20th for the entire Lake region, except Lake Ontario. These signals were late for the Upper Lake region. On the morning of the 21st, signals on Lakes Michigan and Superior, and at midnight on the other Lakes, were lowered. The following maximum velocities were reported: Marquette, Cleveland and Sandusky, W. 26 miles; Alpena, W. 29; Grand Haven, SW. 34; Buffalo, SW. 36. On the Atlantic coast Off-shore Signals were hoisted at midnight of the 20th from Chincoteague northward to Sandy Hook and were lowered at noon of the 22nd. The following maximum velocities were reported: Delaware Breakwater, SW. 28 miles; Cape May, NW. 30.

No. IX.—On the 21st the barometer fell sharply in the North Pacific coast region and on the morning of the 22nd the lowest pressure was at Olympia, 0.25 below the normal. Moving nearly southeastward the area was central during the morning of the 23rd in Montana and at midnight in southern Dakota. Changing its course to the northeast the central area reached Minnesota at midnight of the 24th, and during the 25th passed northeastward over Lake Superior into Canada. On the afternoon of the 24th Cautionary Signals were ordered for Lake Superior and the northern half of Lake Michigan. These signals fully justified—except at Duluth—remained displayed for advancing low area No. X until the 26th.

No. X.—This area apparently sprang up from remains of low area No. IX. The morning of the 25th the lowest pressure was at Dodge City, 0.32 below the normal. Moving northeastward the area was central in Iowa at midnight, and on the following morning in Wisconsin; Milwaukee barometer 0.42 below the normal. Continuing its northeastward course the centre reached Ontario at midnight; Rock-liffe barometer 0.46 below the normal. The afternoon of the 25th Cautionary Signals were ordered for Chicago, and the signals displayed on Lakes Michigan and Superior were continued. During the 26th Cautionary Signals were ordered for the rest of the Lake region. These signals were lowered on Lakes Michigan and Superior at midnight of the 26th and in the rest of the Lake region during the following day. These signals were somewhat late for Lake Erie. The following maximum velocities were reported: Toledo, W. 25 miles; Cleveland, S. 26; Marquette, W. 28; Escanaba and Milwaukee, N. 38; Grand Haven, SW. 24.

No. XI.—During the 27th the trough of low pressure—an off-shoot of low area No. X—covered the Blue Ridge and Cumberland Mountains and at midnight was central in West Virginia; Lynchburg barometer 0.33 below the normal. Moving northeastward the area was central the morning of the 28th, with high pressure, in Pennsylvania; Philadelphia barometer 0.47 below the normal. On that afternoon the lowest pressure was over New Hampshire; Boston and Portland barometers 0.48 below the normal. At that time the wind on Mt. Washington was S. 66 miles, having changed that morning from northwest—its normal direction—to south. By midnight the storm-centre had passed northward to the valley of the St. Lawrence; Father Point barometer 0.59 below the normal. On the morning of the 28th Off-shore Signals were ordered from Chincoteague to Sandy Hook, and were lowered on the afternoon of the 28th. The following maximum velocities were reported: Sandy Hook, W. 29 miles; Chincoteague, SW. 30; Delaware Breakwater, W. 33; Cape May, W. 34.

No. XII.—This area apparently developed in Saskatchewan during the 26th, and moving south-eastward was central midnight of 27th in Minnesota; Duluth barometer 0.30 below the normal. Moving slowly eastward over Lake Superior it was central, with decreased pressure, at midnight of the 28th over Lake Ontario; Parry Sound barometer 0.49 below the normal. During the day (28th) rain and sleet, severe squalls, high seas and rough weather prevailed on Lakes Erie and Ontario. During the 29th the centre moved northeastward into Canada, while brisk westerly winds, in connection with high area No. VI, prevailed on all the Lakes, except Superior. At midnight of the 28th Cautionary Signals were ordered for Lake Ontario and the eastern half of Lake Erie, and were lowered on the morning of the 30th. The following maximum velocities were reported; Buffalo, W. 28 miles; Cleveland, W. 29; and Erie, W. 30.

No. XIII.—During the 29th the barometer fell rapidly in the extreme Northwest, and on the afternoon of the 30th the barometer at Yaukton was 0.12 below the normal. At midnight of the 30th the lowest pressures were at Omaha and Dodge City, 0.12 below the normal.

INTERNATIONAL METEOROLOGY.

Three International charts, Nos. IV, V and VI, accompany the present Review. They are for the months of *August, 1880* and *January, 1879*.